## CONSTRUCTION SPECIFICATIONS

1. All construction - shall be done in accordance with all applicable State and Local Statutes and Guidelines. Waterlines and all necessary appurtenances are to be installed and disinfected following the Manufacturers recommendations and AWWA Specifications.

2. Well Pumps:

✳ Well #1 - Goulds Submersible Pump - Model UH66LT32 - 10 HP - 8 Stage - 3 Phase - 230 Volts with Furnas Magnetic Starter No. 2 capable of producing 87 gpm against 326' TDH.

△ Well #2 - Goulds Submersible Pump - Model 18E30412 - 3.0 HP - 19 Stage - 1 Phase - 230 Volts with Goulds Motor Control Box No. 00104 capable of producting 23 gpm against 364' TDH.

Well A - Goulds Submersible Pump - Model 18E15412- 1.5 HP - 11 Stage - 1 Phase - 230 Volts with Goulds Motor Control Box No. 00104 capable of producing 9 gpm against 342' TDH.

Well C - Goulds Submersible Pump - Model 18E15412 - 1.5 HP - 11 Stage - 1 Phase - 230 Volts with Goulds Motor Control Box No. 00104 capable of producting 5 gpm against 362' TDH.

Well E - Goulds Submersible Pump - Model 18E30412 - 3.0 HP - 19 Stage - 1 Phase - 230 Volts with Goulds Motor Control Box No. 00104 capable of producing 15 gpm against 520' TDH.

Well F - Goulds Submersible Pump - Model 18E30412 - 3.0 HP - 19 Stage - 1 Phase - 230 Volts with Goulds Motor Control Box No. 00104 capable of producing 15 gpm against 520' TDH.

3. Controls:
Well Pumps shall both be operated by the existing pressure control switch at the storage tank.

4. Cable/Wiring:
Pressure Switch to Well - 14/3 Cable
Starter to Pump (Drop Cable) - #6
Transformer to Starter(Supply Wire)- #4(100'Max)

5. Piping:
All Piping shall meet AWWA Standard for Potable Water use.

A. Well Piping and Fittings:
Well piping, fittings and blow-offs less than 4" in diameter shall be of standard strength galvanized steel.
B. Exterior Piping:
Exterior piping 1" or less in diameter to be Type "K" copper or Polyethene P.E. 3408 (160psi). Exterior piping larger than 1" in diameter shall be PVC SDR21 (200) meeting Standard ASTM D2241.
C. Fittings:
All fittings (valves, tees, bends and fire hydrants) to be mechanical joint cast iron construction meeting AWWA Standards for a 150 psi pressure class.
D. Leakage:
Testing and results for pressure and leakage of all water mains shall meet all AWWA Standards. Testing shall be done at 150 psi for two hours. Maximum allowable leakage shall not exceed 0.48 GPH, per mile of pipe, per inch of diameter.
E. Disinfection/Testing:
All proposed tanks and filters shall be painted and disinfected in accordance with Section 9900 of the written specifications. All interior plumbing and watermains shall be disinfected as per Section 2600 of the written specifications. Samples from all mains shall be taken at regular intervals not to exceed 2000 ft: Samples also must be obtained from each tank and filter and the interior plumbing of the filter and booster pump houses separately. All samples are to be drawn from the same locations 24 hours apart until two consecutive samples are obtained.

6. Separation:
In accordance with the regulations of the Commonwealth of Virginia, all proposed waterlines shall provide:

A. 10 foot horizontal separation from all sanitary sewerlines.
B. 18 inches of vertical separation between the bottom of the waterlines and the top of any sanitary sewer which it crosses.
C. 30 feet (min.) distance from any sub-surface drainfield.

7. Trenches:
All trenches to be constructed within existing or future Virginia Department of Transportation Right-of-way shall be compacted in 6 inch layers.

8. The existing 30,000 gallon storage tank-shall remain in service.

9. Utilities:
Existing utilities may or may not be shown in their exact location. Contractor shall verify the location of all existing utilities in the field whether they are shown on the plans or not. Location shall be reported to the Engineer. Any conflict where lines cross shall be handled in accordance with the State Water Works Regulations, Section 12.05.03.

10. Inspection:
All work shall be subject to inspection by the Engineer and/or the County Inspector.

11. Plan Approval:
No work is to begin without written approval of the construction plans.

12. Notification:
Contractor shall notify Franklin County Authorities 24 hours prior to beginning construction. It is the responsibility of the contractor to obtain all necessary permits.

13. Plan Deviation:
Any deviation from the approved plans shall be reported to the County and the design Engineer prior to construction for approval.

14. Electrical Service:
The contractor shall coordinate the necessary electrical service connections with APCO. Services shall meet NEC requirements.

15. As-Built Plans:
Contractor to coordinate necessary information with Engineer to provide as-built plans.

✳ PUMP 1 HAS BEEN REPLACED WITH GOULDS MODEL 25ELGS50, 5 H.P. @ 25 GPM.

△ PUMP 2 TO BE REPLACED WITH GOULDS MODEL 18E 20412, 2 HP @ 9.5 GPM

## FILTER HOUSE DATA AND SPECIFICATIONS

1. Design:

A. Capacity = combined well output = 84 gpm.
B. Filter Rate = 3 gpm per Square Feet - Each Filter = 3.5 feet in diameter.
C. Filter Capacity = 28.8 gpm.
D. Total Filtering Capacity = 115 gpm.
E. Operating inlet pressure to filter = 35 psi (min.)
F. Chemical regeneration - as per Manufacturers Recommendations.
G. Backwash -
1. Rate = 10 gpm per Square Feet for 10 minutes.
2. Volume = 100 gpm.
3. Operating Pressure = 35 psi.
4. Interval - Filters shall be backwashed individually, one per day, after 40 hours of operation (66,000gal).

2. Equipment:

- All equipment to be installed as per manufacturers recommendations.
A. Pressure Filters (4 required)
1. Filters shall be rain soft series 'F42' manufactured by Rain Soft Water Conditioning Company (or equal).
2. All filters shall have a minimum side wall depth of 5 feet and filter washwater trough located 18" (Min.) above the media.
3. Filter media shall consist of a 18" (Min.) layer of graded Anthrocite coal on top of 14 cubic feet (18"Deep) of Manganese Greensand (16.6 Mesh). Formulated from a Glauconite Greensand with iron removal capacity of 12,000 ppm per cubic foot and uniformity coefficient of 1.5.
4. Each Filter shall be fitted with sample taps at the top and midpoint of the Greensand media.
B. Solo Valves (4 Required)
Valves shall be 1 1/2" Solo Series 404 CCA Valves manufactured by Aqua-matic, Inc. (or equal). Each valve shall have three operating positions - Backwash, Regeneration, and Service.
C. Chemical Regeneraton Tank (1 Required)
Tank shall be supplied for holding regeneration solution. Tank shall be in accordance with the Filter Manufacturers recommendation.
D. Chemical Feed System
Shall be Chem-tech International or equal and shall provide:
1. Chlorine and Potassium Permanganate
Feed Pump - Series 100 Model 030 (0 To 30 GPD)
Polyethylene Tank - Series 6000 Model 6155 (55 Gal).
2. Soda Ash
Feed Pump - Series 200 Model 2-100 (0 To 100 GPD)
Polyethylene Tank - Series 8000 Model 8300 (100 Gal).
Each tank shall be supplied with stands, pump mounting brackets and electric mixers.
E. Testing Equipment Capable of Measuring
Chlorine, Iron, PH, Alkalinity, Manganese, and temperature shall be furnished. Testing for Chlorine residual shall be either the DPD or Amperimetric Titration Methods. HACH Company Test Units (Cat. No. 2231-02: 1433-00 and 1467-00) PH Test Units for PH shall be HACH Company (Cat. No. 1464-00 "IR-18") or approved equal.
F. All flow meters shall be Badger 1" Disk Meters or equal, unless specified.
G. A set of scales for weighing out dry chemicals shall be provided having a minimum capacity of 50 pounds and an accuracy of 0.1 pounds+-.
H. Filter House shall be supplied with an exhaust fan, heater and dehumidifier of adequate capacities to control the houses environment.

3. Pipe And Fittings:

All interior pipe and fittings for water, larger than 1" shall be schedule 80 PVC, solvent joints, marked "NDF-PW" for drinking water. All interior pipe and fittings for water 1" and smaller shall be standard Type 'L' Copper, hard temper with cast or wrought solder fittings. Pipe and fittings for water lines through and below the floor slab shall be schedule 80 PVC, "NSF-PW" for drinking water. All pipe and fittings for the wastewater disposal system shall be schedule 40 PVC piping below floor shall be bedded in minimum 6" sand.

4. Chemical Feed:

The following feed rates shown are based upon a flow 110gpm.
A. Chlorine - calcium hypochlorite (HTH), pelletized, with 70% available chlorine. Initial feed solution to be 2.80 pounds chlorine per day (2.5% available chlorine) which will allow an initial feed rate to be 13.5 gpd.
B. Soda Ash - Sodium Carbonate (50% available soda ash); initial feed solution to be 0.75 pounds per gallon which will allow an initial feed rate of 46.0 GPD@20 PPM).
C. Potassium Permanganate - Initial feed solution of 2 oz. per 5 gallons for an initial feed rate of 17.0 gpd.
D. Potassium Permanganate for filter regeneration to be in accordance with the filter manufacturers recommendations.
E. Feeder motors to be controlled automatically by a flow switch located on the incoming lines from the wells. Motor controls shall be equipped with adequate delays to cut on after well pump is running and to cut off simultaneously with well pump.

5. Backwash - Wastewater Treatment

A. Backwash Volumes-
Maximum per filter - 1000 gallons (100 GPM for 10 Min.)
Maximum filter backwash per day = 1 per 24 hour interval peak daily flow =1000 gallons.
B. Absorption Area-
Percolation trench = 3.0' X 100'
C. Materials and Installation-
Materials and installation to be in accordance with requirements of the Virginia Department of Health for subsurface soil absorption systems.

6. General Description of Operation:

A. Treatment-
The system is designed to remove iron and manganese from the wells raw water by the use of pressure filters utilizing Greensand. Chemical feeders are included to add chlorine, soda ash and potassium permanganate prior to filtration. All chemical solutions are to be prepared in the chemical tanks from dry chemicals using electric mixers. Chemicals are to be stored in their original containers in the space provided and portions are to be measured by weighing. A 2500 Gallon in line pressure tank located between the chemical feeders and the filters will serve as a contact tank for the chemically treated water. The well pumps provide the pressure to deliver the water from the well through the treatment system and discharge to the storage tank.
B. Filter Backwash and Wastewater Disposal-
Backwash water is to be tapped from the main discharge line going to the storage tank. Filters are to be backwashed individually on a rotating schedule such that no more than one (1) filter is backwashed in any 24 hour period. Flow meter on the inlet pipe at each filter and pressure gauges graduated over a range of 0.30 feet located on both the inlet and outlet pipes are to be monitored daily for use as a basis for scheduling filter backwash. Backwash is to be initiated manually by the flow control valve on each filter. The rate of flow of the backwash is to be controlled by a throttling valve and flow meter on the main backwash feed line. The backwash waste water is to be discharged into a sump in the floor of the filter room which drains to the backwash waste water disposal system.

EXCERPT FROM ORIGINAL SPECIFICATION – SECTION 2600.

3.19 Disinfection of Water Mains & Accessories

A. General - Water mains and accessories shall be disinfected in accordance with AWWA C601 as attached hereto.
B. Flushing - Prior to disinfection, water mains shall be flushed as thoroughly as possible with water pressure and outlets available. Velocities of water through the pipe during flushing shall be 2.5 feet per second or greater.

C. Disinfection shall be accomplished through the addition of chlorine so that a chlorine residual of 25 parts per million (PPM) remains in the water after 24 hours standing in the pipe. Chlorine may be added either as a chlorine gas-water mixture or a chlorine bearing compound water mixture.
D. Rate of Application - the rate of Chlorine mixture flow shall be in such proportion to the rate of water entering the pipe that the Chlorine dose applied to the water entering the newly laid pipe shall produce at least 25ppm after 24 hours standing. This may be expected with an application of 50ppm or greater.
E. Prevention of Reserve Flow - Valves shall be manipulated so that the stong Chlorine solution in the line being treated will not flow back into the line supplying the water.
F. Retention Time - The minimum retention time for chlorine solution in water mains shall be 24 hours. Valves and hydrants shall operate while the pipeline is filled with the chlorination agent.
G. Final Flush & Test - Following chlorination, all treated water shall be thoroughly flushed from the pipeline until the replacement water throughout the length shall prove comparable to water from the existing public water system. Satisfactory bacteriological samples must be obtained from the newly laid pipeline on two consecutive calender days in order for the line to be considered acceptable. Bacteriological testing shall be in accordance with Section 7.1703 of the Virginia Waterworks Regulations. Samples shall be collected at regular intervals not exceeding 2000Ft. throughout the pipelines.
H. In the event that bacteriological samples are not satisfactory the procedures of Sections C through G shall be repeated until satisfactory results are obtained.
I. All tests shall be performed by a Laboratory approved by the Virginia Department of Health.

NOTE:
THESE PLANS ARE BASED ON THE ORIGINAL PLANS FOR WEST ARROWHEAD VILLAGE, DATED 12-6-89. THESE PLANS ARE REVISED TO SHOW CONNECTIONS FOR WELLS A, C, E AND F.
THESE PLANS ARE "AS-BUILT" DRAWINGS.

REVISED 1-22-01 PER HEALTH DEPARTMENT COMMENTS.

Berkley Howell & Assoc.
ENGINEERS • SURVEYORS • PLANNERS

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| SCALE: | APPROVED BY: | DRAWN BY |
| DATE: 8-23-00 | | REVISED 1-22-01 |

WEST ARROWHEAD VILLAGE
SPECIFICATIONS
DRAWING NUMBER: G OF G

COMM. NO. 000235